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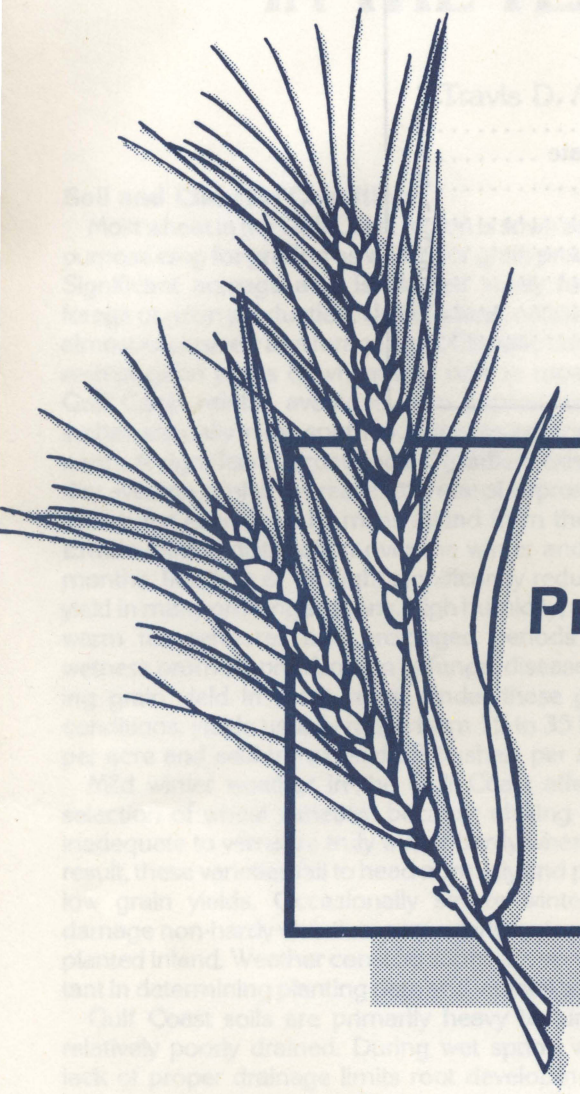

Profitable Small Grain Production In The Texas Gulf Coast

Texas Agricultural Extension Service • Zerle L. Carpenter, Director • The Texas A&M University System • College Station, Texas

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PROFITABLE SMALL GRAIN PRODUCTION IN THE TEXAS GULF COAST

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Soil and Climatic Conditions

Most wheat in the Gulf Coast region is sown as a dual-purpose crop for grazing as well as for grain production. Significant acreage also is planted solely for either forage or grain production. Unlike wheat, oats is utilized almost exclusively as a forage crop. Climatic conditions restrict grain yields of wheat and oats in most years. Gulf Coast rainfall averages from approximately 25 inches annually in the south to 38 inches or more in the north. A significant climatological gradient exists such that average rainfall decreases at a rate of approximately 1 inch for each 7 to 10 miles inland from the coast. Erratic rainfall distribution over the winter and spring months, flooding or drought significantly reduces the yield in many growing seasons. High humidity, relatively warm temperatures and prolonged periods of leaf wetness promote proliferation of fungal diseases, limiting grain yield in most years. Under these growing conditions, yields usually range from 15 to 35 bushels per acre and seldom exceed 55 bushels per acre.

Mild winter weather in the Gulf Coast affects the selection of wheat varieties, because chilling is often inadequate to vernalize truly winter-hardy wheats. As a result, these varieties fail to head normally and produce low grain yields. Occasionally severe winters may damage non-hardy varieties, particularly spring wheats planted inland. Weather considerations are very important in determining planting date and varietal selection.

Gulf Coast soils are primarily heavy textured and relatively poorly drained. During wet spring weather, lack of proper drainage limits root development and adequate tiller formation. Early or heavy rainfall can delay planting dates, occasionally to the point that management decisions must be altered regarding types of wheat to plant. Inland soils are more varied, with a wider range of textures and generally better external drainage because of topographical features. Consequently, better grain yields are often obtained west of Highway 77.

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Rotations

Small grains provide an important rotational crop to relieve problems associated with continuous corn or sorghum production. Wheat production provides an excellent opportunity to control rhizome johnsongrass, a serious yield-limiting weed in corn or sorghum production. The fallow period following wheat harvest in April or May is a good time to control johnsongrass and many other weeds which pose problems in rotational crops. Wheat production allows the use of a different spectrum of herbicides for weeds that are difficult to control in other grain crops, as well as providing a fallow season during the summer when growers can achieve relatively inexpensive mechanical or chemical weed control.

The increase in Gulf Coast corn acreage was attributable to higher returns per acre from corn than from many alternative crops. This led to a monocultural cropping of corn and a subsequent increase in grassy weeds and soil insect problems such as the western corn rootworm. Wheat used in the crop rotation gives growers a chance to control perennial and summer annual grasses which plague corn production as well as avoid damage from corn rootworms.

Rotation from crops treated with persistent herbicides such as atrazine, propazine or trifluralin should be approached with caution. Before deciding to plant small grains, be aware of rates and types of herbicide applied to the previous crop. Small grains are especially sensitive to triazine herbicides. Dry weather, high pH, coarse-textured soils, high herbicide application rates and prolonged use of triazines can cause serious herbicide carryover problems resulting in crop injury or stand failure.

Varietal Selection and Planting Date

Along the Gulf Coast, adapted wheat varieties belong to the following three market classes: soft red winter, hard red winter and hard red spring wheat. Each market class is sold for a different usage and often has

Table 1. Planting dates of small grains in the Gulf Coast.

Market class	Grazing		Grain only	
	Day neutral	Daylength sensitive	Day neutral	Daylength sensitive
Hard red winter	September 10 October 10	September 10 October 10	October 25 November 25	October 10 November 20
Soft red winter	September 10 October 10	September 10 October 10	October 25 November 25	October 10 November 20
Hard red spring	None	None	December 10 January 15	November 15 December 5
Oats	September 1 October 10	None	October 15 November 20	None

a different demand and pricing structure. Hard red winter and hard red spring classes usually command better prices than does soft red winter wheat. Evaluate local markets before planting soft red winter wheat for grain.

Winter wheats require a period of chilling or vernalization to stimulate the formation of heads. Spring wheats have no chilling requirements. Within the winter wheats there is a substantial difference in chilling requirements between varieties. For the Gulf Coast, consider only those varieties with very low chilling requirements, as wheats with a significant chilling requirement may fail to initiate seed heads following mild winters.

Within the various market classes, two types of wheat can be defined in relation to their response to daylength or photoperiod. Day neutral or daylength insensitive winter wheats produce heads as soon as temperatures are favorable, once chilling requirements are met and days become long enough to meet the requirements of a given variety.

Day neutral spring wheats have no chilling requirements and essentially mature at a rate proportional to heat unit accumulation and environmental stress. Daylength sensitive spring wheats such as Nadadores 63 or Era must be planted earlier than day neutral spring wheats. This insures adequate vegetative development at the time daylength becomes adequate to initiate heading. Use care in selecting the appropriate planting date for the type of wheat selected (table 1).

Day neutral spring wheats provide a good alternative if weather conditions prevent planting winter wheats on time. The short interval of vegetative growth and poor tillering ability of spring wheats eliminate them for grazing. South Texas data indicate that winter wheats have a yield advantage over spring wheats when both can be planted under favorable conditions. If planting is forced past the optimum date by weather conditions, spring wheats may show an advantage over winter types. Examples of common varieties within the various wheat types and classes are listed in table 2.

If the various wheat types are planted significantly out of the range of recommended planting dates, there is a considerable risk of crop failure. Grazing of day neutral winter wheats reduces the risk of spring freeze injury, as the initiation of heading is inhibited by frequent clipping. Day neutral winter wheats planted too late risk the lack of vernalization and inadequate time for producing tillers, while planting too early increases the risk of damage from foliar diseases, aphids and spring freezes. Less risk of spring freeze injury exists with daylength sensitive winter wheats, as heading dates are similar without regard to planting date. Do not plant day neutral spring wheats early (before December 10), as they will head out before the probability of freezing weather abates.

Table 2. Wheat varieties listed by market class and photoperiod sensitivity.

Market class	Day neutral	Daylength sensitive
Hard red winter	NK Pro 812 Mit, Collin	Sturdy
Soft red winter	Florida 302 Terral 817	Pioneer 2550* Coker 747*
Hard red spring	DK-22 S, DK 49 S	Nadadores 63

*Not recommended for the Gulf Coast.

Planting Practices

Much of the wheat seed planted in the Gulf Coast is produced on area farms and saved during the harvest operation. The quality of this seed is affected by environmental conditions during seed production and stress induced by plant disease. Save seed only if they are plump, free of trash and weed seed and have a good germination percentage. Do not store wheat seed with a moisture content over 13 percent. A good fungicide treatment on planting seed reduces the incidence of seedborne diseases. Registered or certified seed purchased from a reputable source gives the buyer better quality control standards than purchasing bin run seed. Planting small acreages of registered or certified seed each year on "clean" or weed-free land can

provide quality planting seed for the next growing season if proper cleaning, storage and seed treatments are used.

The amount of seed to plant varies with seedbed conditions, seed quality, planting date, variety and type and use of wheat to be planted. Higher seeding rates are required to compensate for late planting dates, dry or rough seedbed conditions or poor seed quality. When planting wheat for grazing or for grain production in fields with a high yield history (above 50 bushels), seed at a rate 20 percent greater than normal. Under favorable planting conditions, high seeding rates offer no advantages. Spring wheats must be seeded at approximately 50 percent higher rates than winter wheats, as they have very low capacity to produce tillers (table 3).

Table 3. Optimum seeding rates for wheat and oats in the Gulf Coast.

Crop	Pounds seed per acre	
	For grazing	Grain only
Winter wheat	90-120	60-75
Spring wheat	—	90-120
Oats	100-120	60-90

Oats is produced in this region primarily as a forage crop. High seeding rates benefit early forage production, as increasing the plant population increases the forage production rate. No advantage is associated with seeding rates of more than 100 to 120 pounds for forage production. Optimum grain production can be obtained at much lower planting rates (table 4). Oats has more flexibility with planting dates than winter wheat, as it does not have the same chilling or vernalization requirement.

Oats does not yield as well when planted in the spring. Increase seeding rates with late planting. Most oat varieties adapted to the Gulf Coast are day neutral.

Although adequate stands can be obtained with broadcast seedings incorporated with a field cultivator or disk, stands established with grain drills are more uniform and utilize less seed to obtain the desired plant population. Use of narrow row drills increases yields where wheat is planted in high yield environments. Narrow rows (less than a 7-inch interval) have no proven yield advantage in the Gulf Coast.

Fertilization

A soil test is the best means of determining the soil's nutrient status and predicting the amount of fertilizer to apply. The application rate of a given nutrient depends upon the level of that nutrient in the soil, cropping history, plant residue, expected yield, available moisture, grazing practices and general management. Fertilizer recommendations are based upon realistic yield goals, as fertilizer requirements increase proportionally with crop yields. In many cases, actual yields are lower than predicted yields because of factors such as poor weather or plant disease. In these situations, considerable amounts of nutrients may remain unused in the soil. Carryover nutrients can reduce fertilizer requirements the following year. For the best fertilizer use, set realistic yield goals and use approved soil testing facilities and recommendations before planting. When submitting soil samples to the Soil Testing Laboratory, provide recent cropping history of fields sampled and the grazing management to be followed (table 4).

Small grains that are grazed before grain production need more fertilizer. The forage removed through intensive grazing contains a large amount of nitrogen. Small grain forage contains about 70 pounds of nitrogen per ton. Under heavy grazing, 2,000 to 3,000 pounds of forage are removed over the 100- to 120-day grazing period, causing the loss or redistribution of 70 to 105 pounds of nitrogen per acre. Nitrogen requirements are also higher when small grains follow high-residue crops, such as grain sorghum. Apply one-half to two-thirds of the nitrogen and all the phosphorus and potassium prescribed by the soil test before or at the time of seeding. Depending on moisture conditions, topdress with additional nitrogen when removing livestock or before jointing in January or very early February.

When nitrogen and potassium are applied directly in the seed furrow, rates should not exceed 15 pounds per acre for wheat and 30 pounds for oats. Applying

Table 4. Fertilizer recommendations for small grains for grain and grazing.

Soil test level	Small grains for grain only			Small grains for grazing only or grazing plus grain		
	N	P_2O_5	K_2O**	N*	P_2O_5	K_2O**
VL	60	40	30-40	100-140	60	50-60
L	40	30	0-20	80-120	40	40-50
M	30	20	0	60	30	0-30
H	0	0	0	0	0	0
VH	0	0	0	0	0	0

*Use the higher nitrogen rate under irrigated production. Apply half of nitrogen at planting and the remainder in early February. Tables based on 40-bushel wheat or 80-bushel oat yields with moderate stocking rates.

**Results from numerous analyses indicate low probability of medium or low K_2O levels in heavy textured soil.

phosphorus with the seed often increases yield, fall growth and cold tolerance, especially on soils low in this nutrient. Phosphorus increases winter hardiness by promoting seedling vigor and development of an extensive root system.

Grazing Practices

Wheat and oats make excellent pastures during the late fall, winter and early spring. Forage yields of 2,000 to 3,500 pounds of dry matter per acre can be obtained during the 90- to 120-day grazing period from early planted small grains. Oats provides a greater forage yield than wheat but is considerably more sensitive to winter kill. Occasionally all top growth is lost in one abnormally cold period. The forage provided by small grains is quite nutritious, with protein contents averaging 20 to 25 percent. Weight gains of 1.5 to 2.0 pounds or more per day are common for light stocker cattle on small grain pastures.

Grazing management has considerable impact on grain yields. When properly managed, the impact of grazing on grain yields is slight. Overgrazing, grazing during very wet weather and moving cattle late can severely reduce grain yields. Manage grazing so that some green leaves always remain on the plant. Severe defoliation weakens small grain plants and delays regrowth. Do not turn cattle into fields in which seedlings are not yet anchored by a strong secondary root system. Wait until plants are 6 inches or more in height and adjust stocking rate to leave at least 3 to 4 inches of green leaves on the plant. Grazing wet fields, particularly those with a clay texture, causes considerable compaction and loss of stand from trampling. During wet periods, remove cattle and place them on a firm grass pasture with an adequate hay supply. This reduces trampling losses and soil structure damage in prolonged wet weather periods.

If wheat or oat grain is to be harvested, remove cattle before "jointing." Damage to developing heads by grazing or trampling severely reduces yield. The removal date varies from year to year and among varieties but often occurs between January 25 and February 10. Day neutral wheats nearly always joint before daylength sensitive types such as Sturdy. Carefully examine wheat fields for jointing on a regular basis beginning around January 15.

The best procedure to detect jointing involves pulling up intact plants and dissecting (splitting) the oldest or largest tillers with a sharp knife or razor blade. The newly formed head will be less than 1/4 inch long. A hollow space develops behind the newly formed head as it pushes up the stem. If this head or the resulting hollow space is detected, remove cattle as soon as feasible to reduce grain losses. It usually takes only 2 or 3 days for the growing point to move upward from the crown node to the level where cattle will damage it by clipping.

Grazing is beneficial to small grains from the standpoint of disease prevention. Cattle reduce the mass of foliage present in the late fall and winter, allowing plant surfaces to dry faster and thereby reducing conditions which favor leaf diseases. In grazing, cattle consume many of the fungal organisms before they can mature and shed spores. These organisms do not adversely affect the cattle that consume them.

Disease Control

The best protection from foliar fungal diseases has historically been selecting adapted varieties with a genetic resistance to the disease in question. Resistance of a variety to the dominant races of leaf rust usually does not last more than 4 to 5 years. Leaf rust fungi have a remarkable ability to adapt to the genetic makeup of any wheat variety planted on a large acreage. As wheat acreage has increased in South and Central Texas, the process by which rust races adapt to previously resistant wheats has accelerated. It is difficult to reliably predict how long the given "package" of genetic resistance in a wheat variety will last. Planting a diversity of genetic materials (several varieties with different genes for resistance to leaf rust) is one method to slow the loss of adapted leaf rust resistant varieties and hedge against catastrophic loss from leaf rust or other diseases.

The principle diseases which limit wheat yields in the Gulf Coast are leaf rust, stem rust, powdery mildew, septoria leaf blotch and barley yellow dwarf. Stripe rust can also occur in seasons with mild winters. Numerous other wheat diseases cause damage from time to time but are less pervasive (table 5). Crown rust is the most consistently damaging oat disease, although stem rust and barley yellow dwarf virus are also important.

Fungicides available to protect against leaf and stem rust are expensive and usually cannot be justified on wheat with a low production potential. In severe disease situations where soil moisture and crop conditions are good, effective fungicide applications can increase yields more than 20 percent. The best timing for application varies with weather and progression of the diesase. A good fungicide program should maintain the health of the upper two leaves from the time of flag leaf emergence through the soft dough stage. These two upper leaves are responsible for approximately 80 percent of the yield of a wheat plant. When applying foliar fungicides, use a high carrier volume and get good leaf coverage. Poor control results from cutting recommended rates or inadequate coverage.

Multiple low rate applications of fungicide appear to provide better control than single applications with relatively high rates.

Weed Control

Land that has not been frequently planted to small

Table 5. Small grain diseases, their source of infection and control measures.

Disease	Source of infection	Control suggestion
Leaf rust Stem rust Stripe rust	Airborne spores	Use adapted varieties with best resistance. Bayleton®, Tilt® and mancozeb fungicides offer protection. Grazing reduces leaf rust pressure in the fall and winter.
Foot, crown and root rots	Spores borne on crop residue, soil, seed and in the air	Rotate with unrelated crops. Bury crop residue. Use effective seed treatments.
Loose smut of wheat and barley	Infected planting seed. New infections occur at heading time and infected seed appear the same as healthy seed.	Use healthy, non-infected seed. Treat seed with Vitavax®.
Loose smut of oats	Spores on seed oat	Loose smut of oats is not systematically seed borne. Use a seed protectant fungicide.
Bunt	Spores are seed or soilborne.	Use a seed protectant fungicide.
Wheat streak mosaic	Virus is transmitted by the wheat leaf curl mite.	Control volunteer wheat. Avoid early planting if this disease is a problem.
Barley yellow dwarf	Virus is transmitted by aphids.	Control aphids and select varieties showing less damage. Avoid early planting.
Seed rots and seedling diseases	Seed and soilborne spores	Use seed protectant fungicides.
Powdery mildew	Spores borne on crop residue and in the air	Select varieties with genetic resistance. Bayleton® is an effective fungicide but economic justification is rare.
Septoria-leaf and glume blotch	Crop residue and seed borne spores	Bury crop residue, *rotate* and treat seed.

grains usually has few weed problems if an early, vigorous crop stand is achieved. If seeded in a clean, well prepared seedbed, small grains often form a a canopy before weeds become established. Crop rotation is important because cool season weeds, which are not common in sorghum, corn or cotton production, become competitive in continuous wheat. Examples include mustards, henbit, thistles, ryegrass, rescuegrass and other brome species.

Use of weed-free seed is important. Clean the combines before harvesting uninfested fields. If possible, custom applicators should harvest clean fields first and progress to more weedy locations. Adjust planting dates so that seedbed preparation destroys weed stands before planting. Grazing reduces vigor and seed production of some palatable weeds.

Herbicides available for controlling broadleaved weeds include dicamba (Banvel)®, bromoxynil (Brominal® or Buctril®), 2,4-D, MCPA and chlorsulfuron (Glean®). Glean® can be applied preemergence or post-emergence; all of the other herbicides are applied post-emergence. Both Banvel® and 2,4-D are state limited-use pesticides to be sold only to certified applicators. Their use is regulated in certain counties and growers should comply with all restrictions. Table 6 gives rates and application suggestions.

Herbicides labeled for grass-type weeds such as wild oats and bromes (cheat, rescuegrass) include triallate (FarGo®), difenzoquat (Avenge®), barban (Carbyne®), metribuzin (Sencor® or Lexone®) and diclofop (Hoelon®). Avenge and Carbyne are applied post-emergence and Far-Go is applied preplant incorporated. Hoelon may be applied either preemergence or post-emergence. Lexone or Sencor is effective for controlling some bromegrasses, but they are restricted primarily to varieties not adapted to this area. Sencor may injure varieties other than TAM 101, TAM 105, Newton, Hawk, Victory, Wrangler, Garst 64 or Pioneer 2157. Do not use on sandy soils or soils with less than 1 percent organic matter or a pH greater than 7.7. Avenge, Carbyne and Hoelon are of limited value in this region because treated fields cannot be grazed.

Presently the most successful methods for controlling wild oats and brome grasses are crop rotation and heavy grazing to prevent seed formation.

For detailed weed control information, see the Texas Agricultural Extension Service publication MP-1059D *Suggestions for Weed Control with Chemicals in Small Grains* or contact your county Extension agent.

Insect Control

Aphids are perhaps the most important pest of small grains for the Texas Gulf Coast. The greenbug is the major small grain aphid. In most years, damaging

Table 6. Herbicides applied post-emergence for controlling broadleaved weeds.

Herbicide	Rate/acre	Time of application	Precautions
chlorsulfuron (Glean)	1/6-1/2 oz	Preemergence or post-emergence plus a surfactant when weeds are less than 2 in tall and wheat is in the two- to three-leaf stage but before the boot stage	Do not use in oats. Do not rotate to crops other than wheat, barley or oats for 14 months.
dicamba (Banvel)	4 fl oz	After emergence to joint stage of wheat, oats or barley	Read and follow label. Avoid drift to susceptible crops.
bromoxynil (Brominal, Buctril)	Brominal ME4 1/2-1 pt Buctril 2EC 1 1/2-2 pt	After emergence to boot stage of wheat, oats or barley	Apply while weeds are small. May be mixed with other herbicides. Do not graze for 30 days after application.
MCPA	1/2 to 1 1/2 pt active	When wheat, oats or barley is in three- to four-leaf stage but before early boot stage and while weeds are small	Prevent drift to susceptible crops.
2,4-D	1/2 to 2 pt	Apply after grain is fully tillered but before boot stage of wheat, oats and barley. May also be applied after soft-to-hard dough stage for late season weeds	The high rate may cause injury. Oats is more susceptible to injury. Avoid drift to susceptible crops. Do not graze animals for 7 days after application.

populations develop in fields in the area. However, an individual producer may not need to apply control measure for greenbugs every year. Sorghum, johnsongrass, wheat and other small grains provide a host for greenbugs throughout most of the year. Greenbug damage is often most severe during cold weather which slows the development of beneficial insects.

Other aphids found on wheat include the oat birdcherry aphid and the corn leaf aphid. Generally these aphids do not cause economic damage.

Foliage feeders, such as fall armyworms and armyworms, can destroy seedling stands when weather conditions are extremely favorable for these pests. Damage is heaviest in fields planted early for grazing. Armyworms or fall armyworms which attack in the spring before wheat matures to the hard dough stage can cause reduced yields. Armyworm and fall armyworm damage generally occurs following a mild winter.

For further information concerning pests of small grains and control measures for these pests, see B-1251 *Managing Insect and Mite Pests of Texas Small Grains* and *B-1572 Aphids on Texas Small Grains and Sorghum.*

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